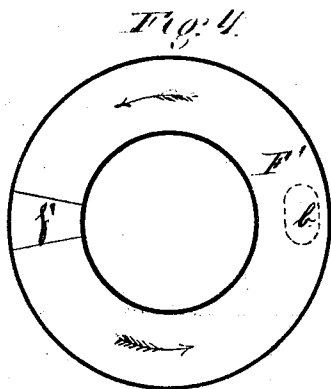
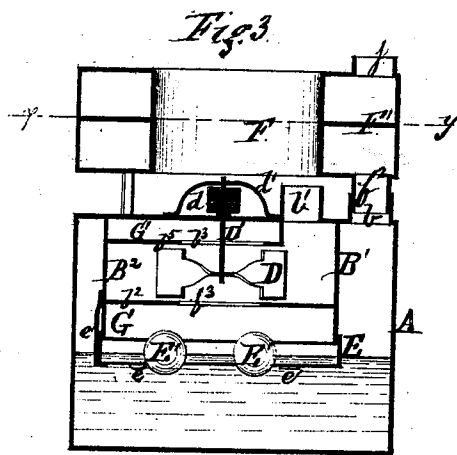
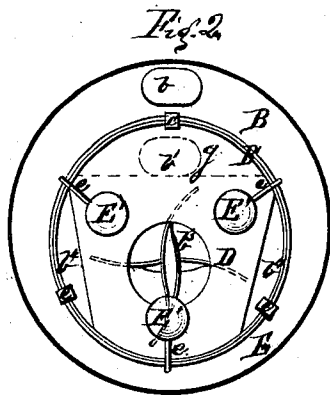
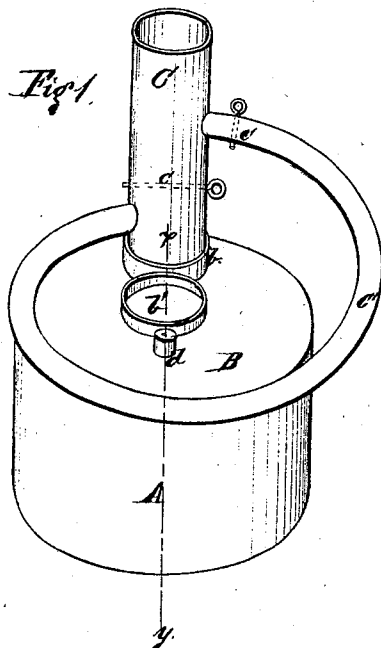


Spark Arrestor.

No. 98293.

Patented Dec. 28, 1869.



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JOHN S. PATRIC AND LEWIS PATRIC, OF ROCHESTER, NEW YORK.

Letters Patent No. 98,293, dated December 28, 1869; antedated December 24, 1869.

IMPROVEMENT IN DRAUGHT AND SPARK-EXTINGUISHING DEVICES FOR STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, JOHN S. PATRIC and LEWIS PATRIC, of Rochester, county of Monroe, and State of New York, have invented a new and improved Method of Creating Draught and Extinguishing Sparks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is an elevation of our improved apparatus;

Figure 2, a bottom view, with the lower part of the shell or cylinder removed;

Figure 3 is a vertical sectional view, through line *x y*, fig. 1; and

Figure 4 is a longitudinal sectional view of the drum, through the line *x y*, fig. 3.

Similar letters of reference denote corresponding parts in all the figures.

The invention relates to the provision of means for creating a powerful draught for the furnaces of steam-generators, in cupolas of foundries or smelting-works, for stoves or ranges, or for any similar purpose, whereby the necessity of constructing tall chimneys or smoke-stacks can be avoided, and at the same time a much larger percentage of the heat generated in said furnaces or stoves can be utilized, and great economy in the consumption of fuel obtained.

The invention further relates to the construction of a device adapted to arrest the sparks and soot produced in a furnace or stove, thus removing the objections heretofore existing to the use of shavings and similar light fuel, in factories or mills located in densely-populated portions of towns or cities.

The first of the above-named objects is accomplished by creating a vacuum in the flue, through which the heated air, smoke, and gases pass, after leaving the furnace or stove, substantially in the manner hereinafter described, which vacuum is produced by mechanical means, instead of by the rarifying of the air in a chimney or smoke-stack, as in the present construction, and the second object referred to is attained by passing the current of smoke and gases through a stratum of water, before reaching the point at which the vacuum is created.

The construction and operation of our apparatus will be fully understood from the following description.

In the drawing—

A represents a cylinder or shell, which we prefer to make of sheet-metal.

One head, B, of this shell is fitted tightly, but is removable, and is provided with an induction-port, *b*, and an eduction-port, *b'*.

Upon the under side of, and secured to head P, is a cylinder, B¹, open at its lower end.

Within this cylinder is an exhaust-chamber, B²,

joined by two diaphragms, *b² b³*, extending across cylinder B¹.

The exhaust-chamber B² is not, however, circular throughout its entire circumference, as each of these diaphragms has a segment cut off from it, as shown at *b⁴*, fig. 2, and the two are connected by a vertical wall or partition at these points, instead of being connected by the side of cylinder B¹, as they are throughout the remainder of their extent, thus leaving a vacant space, conforming in shape to that shown at *b⁴*, fig. 2, which connects the space marked G with the space marked G', fig. 3, and the exhaust-chamber is itself connected with eduction-port *b'* by having the upper diaphragm *b²* cut away, as shown at *g*, fig. 2.

D is a fan, secured to shaft D', which is mounted in suitable bearings in head B and bracket *d*, in such manner that the fan D is suspended within exhaust-chamber B².

d is a pulley, keyed to shaft D', and through which the fan is driven by a belt, as is usual or desired.

E is a gauge, consisting of a ring, fitting cylinder B¹ closely, and operated by floats B', which are attached to it by arms *e*, as will be fully explained.

The gauge E, when not operated upon by floats E', is sustained by guides *e'*, rigidly connected to cylinder B¹.

B is a draught-flue, connecting the apparatus with the furnace, and is provided with a valve, *c*.

C is a heating-pipe, which may be extended so as to form two or more coils, instead of one, as shown, and should also be provided with a valve, *c'*.

F, figs. 3 and 4, represents a drum-beater, consisting of an annular chamber, divided into two flues by the partition F', provided with a throat at *f*, diametrically opposite to the ports *f¹ f²*.

The operation of our apparatus is as follows:

The shell A is filled with water, to a depth sufficient to raise the gauge E nearly or quite as high as it will go, on account of the arms *e* striking the lower edge of cylinder B¹.

The flue C is then connected to the flue from whence the smoke issues, and a rapid rotary motion is given to the fan D by means of pulley *d*. This instantly produces a vacuum in the spaces G G', the air passing in to the exhaust-chamber, through ports *b² b³*, and being driven out through eduction-port *b'*.

The immediate effect of exhausting G G' is to lift the water up into G', until that occupying the annular space surrounding cylinder B¹ drops below the level of the gauge E, when the air and smoke, filling the shell A and flue C, rush in to fill the vacuum, but in so doing, are compelled to pass through the water enclosed within cylinder B¹, depositing in it (the water) all cinders and soot.

The location of the apparatus will, of course, be

governed entirely by circumstances, as from the fact that the draught through the fire is not at all dependent upon its proximity to the exhaust, the latter can be placed at such point as convenience may dictate.

In case it is desired to utilize the heat closely, for warming a room, an economical drum for that purpose is shown at F, in which the hot air and smoke enter at *f*, fig. 3, and pass around the drum above the diaphragm F, fig. 4, to the throat *f'*, thence down into the lower half, and back to the opening *f''*, thus affording a large radiating-surface, which may be increased to any desired extent.

In fig. 1 another modification of the construction, adapted to heating by means of a pipe or a series of pipes is shown, in which, by closing the valve *c*, and opening valve *c'*, the heat is carried, through pipe C, such distance as may be required, returning to flue C below valve *c*, and is as perfectly under control, so far as heating a room is concerned, as is a register of an ordinary furnace, whilst from the fact that the strength of the draught does not depend upon the distance over which the smoke is made to pass, the radiating-surface may be increased until all the heat is utilized, and one ton of coal or cord of wood made to serve the same purpose as two of them do now, while by the same operation all the soot and cinders are removed, and further, the noxious gases are also absorbed by the water, so that the discharge from the eduction-port can be breathed with impunity, thus doing away with the objections heretofore existing to the location of factories and mills in thickly-settled parts of towns and cities, and which has driven them out into inconvenient localities.

This apparatus is capable of arresting sparks from a locomotive.

The difficulty in using water for that purpose before has been that it has been considered necessary to use the exhaust-steam to promote draught in the fire-box, and the strong blast produced by this discharged steam made it impractical to use water for that purpose, but by our invention we can create the desired draught independent of the steam, and pass only the smoke (which forms but a small part of the volume which is now sent through the smoke-stack) through the water, and that by the employment of but an inconsiderable amount of power.

We are aware that many arrangements have been invented for removing dust and cinders from air, by

bringing the air into contact with water, or a spray of water, but in all previous methods it has been done by forcing the air forward by pressure, whereas we have reversed the operation; that is, we draw it (the air or smoke) through the water, by means of devices which aid in forming a vacuum, thereby gaining some decided advantages, as, for instance, in the fact that all escape of the smoke and gases, resulting from leakage of the conducting-flues, is overcome, the tendency being to leak into the flues rather than out, the pressure being constantly from the outside.

Another advantage is in producing a better and freer combustion in a furnace.

If a sufficiently rapid motion be given to the fan, the water will be drawn up through the lower port *b'*, and beaten by the fan F into a fine spray, through which the smoke is obliged to pass, and which effectually arrests and extinguishes the sparks.

We have found, upon trial, that the smoke, after passing through the apparatus, is cool, and disposed to settle upon the ground, and may be delivered into servers, and carried off in that manner.

Having now described our invention,

What we claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the chamber A with its internal and external co-operative devices, whereby a stratum or spray of water is rendered available in advance of the exhaust-fan or apparatus, by means of which the smoke and other products of combustion are forced through the flue or chamber, substantially as herein set forth.

2. The arrangement of the outer shell or drum A, provided with induction and eduction-ports *b* *b'*, exhaust-chamber B, and fan D, all constructed substantially as described.

3. The arrangement of heating-flues, provided with valves or dampers, between the furnace and the exhaust, for the purpose of controlling the direction of the current of heat.

4. A floating gauge, E, operating, in combination with the exhaust, substantially as described.

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Witnesses:

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